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From unit optimization to site-wide optimization and industrial symbiosis

Sebastian Engell, Lukas Maxeiner, Simon Wenzel

Process Dynamics and Operations Group, Department of Biochemical and Chemical Engineering, TU Dortmund, Germany

Abstract

In petrochemical and chemical production sites, the various production units are tightly coupled by networks of utilities, raw materials and intermediates. The connecting networks often have limited storage capacities or storage comes at a cost e.g. for liquefying gases. For economic performance as well as energy and resource efficiency of the overall site, these couplings must be taken into account when the operation is optimized. We discuss the overarching optimization of production plants which are connected by networks with limited storage and which have to consume and produce materials according to logistic constraints. The problem can be solved in an integrated (centralized) fashion or in a hierarchical manner with distributed local optimization and a central coordinating instance. The latter approach is appropriate in particular when the different plants are under different ownerships as it is already often encountered in chemical parks. The importance of coordination between production plants that belong to different companies will in the future become even more important with the strive for industrial symbiosis as a means to improve energy and resource efficiency.